



Teens With Schizophrenia Lose Gray Matter in Back-to-Front Wave

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Brains of teens with early onset schizophrenia are ravaged by a back-to-front wave of gray matter loss that parallels the progression from hallucinations and delusions to thinking and emotional deficits, National Institute of Mental Health (NIMH) - supported scientists have discovered. This loss of critical working brain tissue begins in rear perception processing areas, and over 5 years engulfs frontal areas responsible for functions like planning and reasoning. Although some loss of neurons and their branch-like extensions is normal during the teen years, as the brain prunes unused connections, the researchers had earlier shown that teens with childhood onset schizophrenia lose 4 times the normal amount in their frontal lobes. The new study is the first to visualize such a pattern of progressive tissue loss in schizophrenia. Paul Thompson, M.D., University of California, Los Angeles (UCLA), Judith Rapoport, M.D., NIMH, and colleagues, report on their findings in the September 25, 2001, *Proceedings of the National Academy of Sciences*.

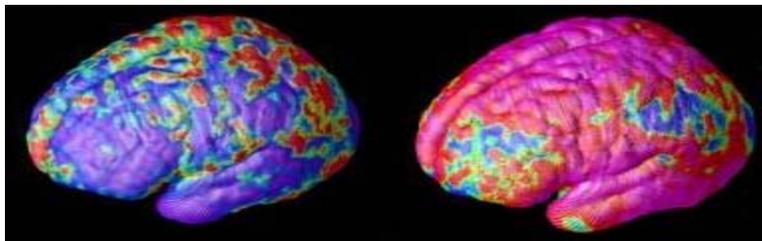
Using magnetic resonance imaging (MRI), the researchers periodically scanned 12 teens with schizophrenia and 12 age-matched healthy teens over 5 years, beginning at age 14. The wave of gray matter loss began in an area above the ear and then spread forward. Since losses in the rear areas are thought to be caused by environmental factors, the findings are consistent with the notion that activation of some non-genetic trigger contributes to the onset and initial progression of the illness, suggest the researchers. The wave of loss correlated with worsening psychotic symptoms and mirrored the progression of neurological and cognitive deficits associated with the disorder. The final profile was consistent with the loss pattern in adult schizophrenia. Another group of 10 teens who were taking anti-psychotic medications for a different disorder did not show the same pattern of changes, reducing the likelihood that the gray matter losses were drug-induced.

The study is part of ongoing research on childhood onset schizophrenia by the NIMH Child Psychiatry Branch, which Rapoport heads. It employed a new 3-D MRI image analysis technique developed by NIMH grantee Arthur Toga, M.D, UCLA Laboratory of Neuroimaging, and colleagues. Support was also provided by grants from the NIH National Center for Research Resources, National Institute on Neurological Disorders and Stroke, and National Institute on Drug Abuse.

Also participating in the study were Jay Giedd, M.D., Peter Gochman, Jonathan Blumenthal, Robert Nicolson, M.D., NIMH, and Toga and Christine Vidal, UCLA.

The National Institute of Mental Health (NIMH) is part of the National Institutes of Health (NIH), the Federal Government's primary agency for biomedical and behavioral research. NIH is a component of the U.S. Department of Health and Human Services.

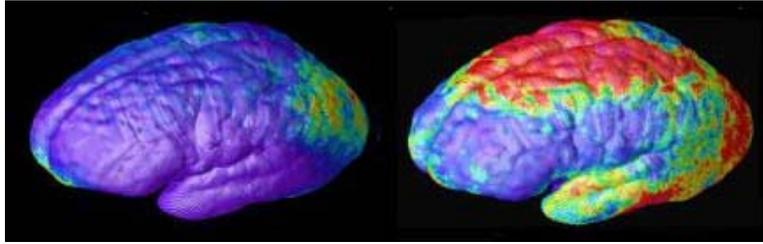
Early and Late Gray Matter Deficits in Schizophrenia



Areas of gray matter loss - shown in red and yellow -- spread from back-to-front (right to left) over 5 years in composite MRI scan data from 12 teens with childhood onset schizophrenia,

beginning at age 14 (left). Red and yellow denotes areas of greater loss.

Rate of gray matter loss



Composite MRI scan data showing areas of gray matter loss over 5 years, comparing 12 normal teens (left) and 12 teens with childhood onset schizophrenia. Red and yellow denotes areas of greater loss. Front of brain is at left.

Source:
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Laboratory of Neuroimaging